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PART I.

Original Contributions.

A CASE OF TUMOUR OF THE OPTIC NERVE.

By GEORGE LAWSON,

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Retro-ocular Tumour of the Optic Nerve; Removal of the Eye with the Tumour; Pathological Report.

TUMOURS of the optic nerve behind the eye but within the orbit are rare. In my own practice this is only the third case I have had. The first case was recorded in the Ophthalmic Hospital Reports, vol. x, p. 296; the second in the fifth edition of my "Manual of Disease and Injuries of the Eye," p. 238; and the third is the case I have now to relate. In each of these cases the eye was blind.

The late Von Graefe recorded a case of tumour of the optic nerve behind the globe, in which the sight was lost ("Archiv f. Ophthal.," x, 1, 194).

Mr. Hulke has also related a case of retro-ocular tumour of the optic nerve in the Ophthalmic Hospital Reports, vol. x, p. 293, in which the vision was reduced to a quantitative perception of light.

The symptoms in the following case were sufficiently pronounced to enable me to suggest that the growth in the orbit was probably a tumour of the optic nerve behind the eye. They were—

1. A protrusion of the eye downwards and forwards, but the proptosis of only a moderate degree.

2. Steady loss of sight, first noticed with the commencement of the proptosis, and terminating in complete blindness.

3. White atrophy of the optic nerve.

The prominent symptoms which seem to indicate tumour connected with the optic nerve are proptosis, with early impairment of vision. The loss of sight in orbital tumours not connected with the optic nerve is caused either by the stretching of the optic nerve from the proptosis, or by the pressure of the growth on the nerve. There is seldom complete blindness, unless the growth by its size has destroyed the functions of the optic nerve, either by pressure or stretching.

In this patient the defect of sight was an early symptom, which progressed to blindness before there was a sufficient stretching of the optic nerve to account for it, or a large enough growth in the orbit to produce it by pressure.

Lastly, with the ophthalmoscope there was seen white atrophy of the optic nerve, with enlarged retinal veins, evidently due to the pressure of a tumour on the nerve; and from its comparatively small size probably directly connected with it.

Clinical Notes. By E. T. COLLINS, *Senior House Surgeon.*

Edward R., æt. 12. Admitted July 25, 1887.

History.—Two months ago his left eye was first noticed to be "larger" than his right, since that time it has gradually increased, and the sight has gradually failed in it; he has not had any pain in the eye, but headache, frontal and behind the ear on his left side at times. He has never had any injury to

the eye or head. He is the eldest of five, four of whom are living; one died aged 2 years, "in a fit."

State on Admission.—Left eye proptosed and displaced forwards and downwards; movements of eyeball good. At the upper and inner part of the orbit is felt a hard mass, extending backwards in close contact to the roof of the orbit. There is no nasal obstruction or deafness, no posterior palatine growth, and no glandular enlargement.

He has no perception of light with the left eye; the pupil is inactive to light. By ophthalmoscopic examination the optic disc is seen to be white, and the margin blurred, the veins big and tortuous, and obliterated in places near the margin of the disc. T.n.

In the right eye the pupil is active; optic disc normal. T.n. and vision $= \frac{20}{20}$.

July 29th. Operation under chloroform and ether.

Mr. Lawson first made an exploratory incision through the upper eyelid in a line parallel with the roof of the orbit. He then passed his finger into the orbit, and was able to detect a tumour entirely surrounding the optic nerve. He next introduced a speculum between the lids, and excised the eye with the tumour around the nerve *en masse*. The wound in the upper lid was closed with fine sutures, and a pad of sublimate wool tied over the whole. The patient soon recovered from the operation, and has since continued well.

Pathological Notes. By J. B. Lawford, *Curator of Museum.*

The left eyeball with the tumour attached were examined immediately after removal. The eyeball externally presented nothing abnormal. Its measurements were vertically 22·5 mm., and transversely 23 mm. When opened antero-posteriorly the only noticeable change was slight but appreciable swelling of the optic papilla.

Behind the globe was a tumour surrounding the optic nerve, and extending backwards from the sclerotic a dis-

tance of 23 mm. In its widest part its diameter was 18·5 mm. Irregularly pear-shaped, with the smaller end forwards, and with a lobulated surface, it was entirely enclosed in the dilated optic nerve sheath. At the posterior limit of the growth where the nerve emerged, it and the sheath were in contact, but the nerve was somewhat thickened. The tumour was fairly firm to the touch, and near its anterior end were felt one or two small cysts beneath the capsule.

After hardening, the eyeball and growth were divided into two lateral halves by an incision, which passed close to the inner edge of the disc. The sketch by Mr. Lapidge (Fig. 1) was made immediately after the section, from the temporal half of the eye and growth. That by Mr. Collins was done from the fresh specimen, shortly after its removal.

Immediately behind the eyeball is a fusiform swelling of the nerve, which, beginning close to the papilla, increases rapidly till, at a distance of 9 or 10 mm. from the sclerotic, it measures 10·5 mm. in its vertical diameter, the greatest width it attains; it then gradually thins down again to the point at which it has been divided, 23 mm. from the eyeball, at which point it is of greater diameter than normal. The outlines of the swollen nerve are quite distinct (see Fig. 1). Between it and the dural sheath is the new growth, which has a somewhat porous speckled surface. It appears to be intimately connected with the nerve, but much less closely with the sheath, from which it can be easily separated. Though surrounding the nerve completely, the greater part is situated on its upper surface. There are several small points of extravasation in the growth, especially in the upper and anterior part close to the eyeball (where there is a tiny cystic cavity) and in the narrow part below the nerve. There is another small cyst close to the capsule, at the posterior superior part of the tumour. The sheath of the nerve, although greatly dilated, is apparently otherwise unaffected.

Microscopical Examination.—The new growth is a sarcoma of loose connective tissue type, which in parts is undergoing myxomatous degeneration.

In those parts which are apparently free from this change, the stroma is finely fibrous, and forms in places a delicate reticulum resembling that met with in lympho-sarcoma, with this difference, that there are no cells in the meshes. It is natural to suppose that these empty spaces contained degenerated cells and stroma which disappeared during the manipulation of the sections; and, though after careful examination and comparison of these areas with those in which degeneration is evident, I am inclined to think that this reticular structure is the original type of the tumour, and not the result of degeneration, it is impossible to be quite certain that such is the case. Throughout the growth the cells are very loosely arranged, and there are no clumps of cells, such as are usually met with in the true myxo-sarcomata. The cells are round and oval, but the former largely predominate. No spindles were found. There are numerous small areas of myxomatous degeneration, but in no section were there found the translucent spherules, described in tumours like this one, by Vossius, Leber, and others. A few of the vessels in the growth show very marked hyaline degeneration of their walls, which are greatly thickened and their lumen almost obliterated, but in none of the sections examined were there any hyaline appendages to the degenerated vessels.

Scattered through the optic nerve are large numbers of cells, which are identical in appearance with the cells of the new growth. The nerve-fibres show little if any change, but the trabeculæ are thickened. The pial sheath can be traced unbroken over the thickened nerve, but it is being invaded by the tumour-cells. The dural sheath, which is but loosely attached to the tumour, is not implicated.

In the parts in which extravasations occurred, there

are several very large bloodvessels, with thin delicate walls, being little more than mere channels in the growth.

Though it is impossible to tell with certainty the site of origin of the tumour, it is most probable that it grew from the connective tissue of the inner sheath, or from the loose tissue of the intersheath space.

ON CONVERGENT STRABISMUS.

By W. Lang, F.R.C.S.,

Assistant-Surgeon to the Hospital, and Ophthalmic Surgeon to the Middlesex Hospital; and

James W. Barrett, M.D., B.S., F.R.C.S.,

Demonstrator and Examiner in Physiology in the University of Melbourne.

I. *Result of Treatment of Convergent Strabismus by the Correction of the Refraction Error, with and without Tenotomy.*

We have been engaged in collecting data on this subject for the past four years; during this time we have had about 350 cases of this disease under observation.

In 102 of these the observations are sufficiently accurate and have extended over a sufficient period to be available for the purposes of the present communication. Our generalisations are inductions from the complex facts ascertained by the periodic observation of these 102 cases.

Method of observation—

1. The distant vision was tested for each eye with and without glasses.

2. The power of fixation of each eye was tested.

3. The movements of the eyes were examined, particular attention being given to the extent of the excursion outwards of the squinting eye.

4. The angle of convergence was measured by a modification of Landolt's method.

5. The iris and ciliary muscle were completely paralysed by atropine, or by homatropine with cocaine.

6. The angle of convergence was again measured.

7. The refraction was estimated by retinoscopy, and the vision with the correcting glasses determined when practicable.

8. The full correction was ordered for each eye, the

glasses were obtained and worn, and then, and not till then, was the use of mydriatics discontinued.

9. The patients returned at intervals of three to six months. At these visits they were examined with respect to —

(A.) The angle of convergence whilst the glasses were worn.
(B.) The angle of convergence when the glasses were removed.
(C.) The vision in each eye.
(D.) The presence of binocular or monocular vision as ascertained by the coloured letter test.

10. In those cases in which this treatment did not produce satisfactory results, the internal rectus was divided. The angle of convergence was measured immediately before and after the operation, and at the usual intervals of three to six months. In no case were the two internal recti divided at the same time, and in very few was it necessary to divide both. No other operative procedure was ever resorted to.

The Method of Measuring the Angle of Convergence.

A McHardy's perimeter was fitted with a large, flat, black screen, having a perforation 5 mm. in diameter, which was placed just above the central fixation point. The head was placed in the usual position, the eyes being on a level with this aperture. The squinting eye was placed in the axis of the instrument, and the patient was then directed to look through this aperture at a distant object. Thus very little or no accommodation could be employed. The deviation could be read off easily by the usual "candle method." This method does not give the deviation with absolute accuracy, since we never troubled to measure the angle α, but as the error for the same individual does not vary, it answers its purpose admirably in a purely comparative investigation.

It may be as well to state that the 102 cases include no case of convergent strabismus from congenital or other paralysis of the sixth nerve, that the ages of the sufferers varied from 4 to 30 years, and that the cases include a few squinting myopic eyes, and eyes with corneal nebulæ.

These points will be again referred to; for the present it is sufficient to state that they are 102 cases which were indiscriminately collected at the Moorfields clinic, and subjected to methodic treatment and observation.

The spectacles ordered were usually large circular ones, the centres being adjusted for distant vision.

Tables I and II show the results of the constant use of glasses during periods of 6 to 24 months.

TABLE I.—*Cases Improved or not Improved by Glasses.*

10 years of age and under (61 cases).		Over 10 years of age (41 cases).	
Cases in which some improvement was effected.	Cases in which no improvement was effected.	Cases in which some improvement was effected.	Cases in which no improvement was effected.
53 or 86·9 p.c.	8 or 13·1 p.c.	34 or 82·9 p.c.	7 or 17·1 p.c.

Taking all the cases together—

Improved by treatment.	Not improved by treatment.
87 or 85·3 per cent.	15 or 14·7 per cent.

It will therefore be seen that cases 10 years of age and under are more amenable to the spectacle treatment than those over 10 years of age.

In some of the cases, however, the improvement only remained so long as the glasses were worn; so soon as they were removed the convergence was as marked, or even more marked, than before.

TABLE II.—*Cases Improved only whilst Glasses were worn and also when Glasses were removed.*

10 years of age and under.		Over 10 years of age.	
Cases in which improvement was noticeable only whilst the glasses were worn.	Cases in which improvement remained after removal of glasses.	Cases in which improvement was noticeable only whilst the glasses were worn.	Cases in which improvement remained after removal of glasses.
15 or 28·3 p.c.	38 or 71·7 p.c.	10 or 31·3 p.c.	22 or 68·7 p.c.

Taking all the cases together—

Improvement only whilst glasses were worn.	Improvement after removal of glasses.
25 or 29·4 per cent.	60 or 70·6 per cent.

Of 102 cases of strabismus then, 60 were permanently benefited by the use of glasses. Again it will be noticed that there is a slight difference in favour of those 10 years of age and under.

Amount of Improvement.—The numbers used refer to the degrees indicated by the perimeter.

TABLE III.—*Amount of Improvement whilst wearing Glasses.*

10 years of age and under (53 cases).

Average original convergence.	Average amount remaining whilst glasses were worn.	Average amount of improvement.
22·5°	6·9°	15·6°

Over 10 years of age (34 cases).

24·2°	12·4°	11·8°

The effect in the cases 10 years of age and under was very striking, since 6·9° was the *average* amount remaining, and the remaining convergence of 5° may be considered as a fair result of any treatment in hospital practice where the time cannot be expended to bring about a restoration of binocular vision.

The effect in the cases over 10 years of age was not nearly so good, and in fact the details of observations show that the older the individual the less amenable is he to the spectacle treatment.

But it must be remembered that the results stated in the preceding table were only obtained whilst the glasses were worn.

TABLE IV.—*Amount of Improvement without the Glasses.*

10 years of age and under (38 cases).

Average original convergence.	Average amount remaining without glasses.	Average amount of improvement.
24·5°	12·8°	11·7°

Over 10 years of age (22 cases).

22·7°	14·7°	8°

Again the difference in the result between those of different ages is very marked indeed.

Combining Tables III and IV we get—

TABLE V.

(87 Cases).

Average original convergence.	Average amount remaining whilst glasses were worn.	Average amount of improvement.
23·2°	9·1°	14·1°

(60 Cases).

	Average amount remaining without glasses.	
23·8°	13·5°	10·3°

As before stated the length of time the glasses were worn was usually from 6 to 24 months. As a general rule the longer they were worn the greater was the beneficial result. This remark applies with greater force to those under than to those over 10 years of age.

As is necessarily implied by the foregoing tables, in a considerable number of cases absolute cure of the deformity

was effected by this treatment, even when the spectacles were removed; and in a larger number cure was effected so long as the glasses were worn.

In the following table all cases in which the convergence did not exceed 5° are regarded as cured. When one remembers the variability of the normal angle α, it will be seen that this is not giving too much latitude. In several of the cases the treatment produced slight apparent divergence.

TABLE VI.—*Cases of Cure.*

	Whilst the glasses were worn.	When the glasses were removed.
10 years of age and under. .	27	8
Over 10 years of age	10	3
Total	37	11

Thus out of 102 cases, 37 or 36·3 per cent. were cured so long as the glasses were worn, and 11 or 10·8 per cent. were permanently cured. Inasmuch as no case was under observation more than two years, it follows that the table is incomplete, since it is exceedingly probable that in the course of a few years a larger number of the 37 cases and others will cease to squint, even when the glasses are removed. The error of refraction being fully corrected, they steadily improve as maturity approaches.

The amount of improvement was often considerable.

TABLE VII.—*Cases in which the use of Glasses produced an Improvement of* 30° *or more.*

	Whilst the glasses were worn.	After removal of the glasses.
10 years of age and under.....	4 (maxm. 45°)	2 (maxm. 38°)
Over 10 years of age	2 (maxm. 35°)	0

TABLE VIII.—*Cases in which the use of Glasses produced an Improvement of* 20° *to* 30°.

	Whilst the glasses were worn.	After removal of the glasses.
10 years of age and under..	14	4
Over 10 years of age	4	2

A survey of Tables VII and VIII again illustrates the greater effect the treatment produces on those under than those over 10 years of age.

At the final examination there was often a considerable difference in the convergence whilst the glasses were worn and after their removal. The change following this removal or application was often instantaneous.

TABLE IX.—*Amount of Alteration in Squint on removing the Glasses at the Final Examination.*

In 59 cases, 10 years of age and under, the average difference was ..... 6·9°

In 30 cases, over 10 years of age, the average difference was ..... 5·7°

In most cases even of cure monocular vision alone was obtained; when binocular vision was obtained it was usually only whilst the glasses were worn, on their removal it became monocular.

TABLE X.—*Result of Removal of Glasses when Binocular Vision had been obtained.*

10 years of age and under (19 cases).		Over 10 years of age (7 cases).	
Monocular vision.	Binocular vision.	Monocular vision.	Binocular vision.
12	7 (including 2 cases of alternating strabismus).	6 (including 2 cases of alternating strabismus).	1

In 27 cases in which the spectacle treatment failed to effect sufficient improvement, simple tenotomy of one rectus was practised.

TABLE XI.—*Difference between amount of Convergence before operation with Glasses, and amount three months after operation with Glasses.*

	10 years of age and under.
Average of 7 cases	14° (maxm. 25°)
	Over 10 years of age.
Average of 18 cases	13·7° (maxm. 25°)

Taking all the 25 cases the average difference was therefore 13·8°.

TABLE XII.—*Difference between amount of Convergence before Operation with Glasses, and three months after operation without Glasses.*

	10 years of age and under.
Average of 9 cases	17·5° (maxm. 23°)
	Over 10 years of age.
Average of 12 cases	14·6° (maxm. 22°)

Or, taking all the 21 cases, the average difference was 15·8°.

A summary of Tables XI and XII shows that the effect of the operation is similar at both series of ages.

A summary of these tables enables us to arrive at certain conclusions, and suggests further investigation.

In 85·3 per cent. the spectacle treatment produced improvement, but in 14·7 per cent. it absolutely failed to do so. What then is the cause of the failure? These cases did not, as far as we can tell, differ from the others in any particular of refraction or other optical condition.

The permanent improvement which takes place after the constant wearing of glasses is probably due to a progressive improvement in the tone of the external rectus,

due to an avoidance of over-use of the internal rectus consequent on the use of glasses. A squint cured with glasses will often reappear within a few seconds after their removal.

Table V shows that the average amount of improvement whilst the glasses were worn was 14·1°; when they were removed 10·3°.

Tables XI and XII show that the effect of tenotomy was 14·7°; therefore the effect of the spectacle treatment is about equal to that of division of one internal rectus (but not necessarily equal to half the effect of the division of both), whilst the glasses are worn, and equal to about two-thirds the effect of simple division when they are not worn; *i.e.*, the permanent effect of the spectacle treatment, followed during 6 to 24 months, is equal to two-thirds the effect of the division of one internal rectus.

Conclusions.

1. The spectacle treatment of convergent strabismus produces a rapid and complete cure in about 10 per cent. of cases.

2. In a larger number (33 per cent.) the cure continues so long as the glasses are worn. In these cases it would probably become permanent in course of time.

3. The effect of this treatment is in direct ratio to the youth of the patient.

4. Spectacle treatment should therefore in the great majority of cases be adopted as an indispensable preliminary adjunct to any operative treatment. By this treatment there is no chance of producing the absolute divergence which occurs sometimes after tenotomy. Exceptional cases occur in which the treatment is inapplicable on account of the occupation of the patients.

5. If the spectacle treatment fails to produce absolute cure, a division of the internal recti generally suffices, together with the use of glasses, to remedy the deformity.

In some few cases the opposite internal rectus must be subsequently divided.

II. *The Refraction in Cases of Convergent Strabismus.*

The following results have been obtained by the systematic examination of a large number of cases of strabismus (about 260). The examination consisted in—

1. The determination of the distant vision for each eye, with and without glasses.

2. Retinoscopy practised at the yellow spot after the ciliary muscle and iris had been completely paralysed by either atropine or homatropine with cocaine.

3. The subsequent determination of the vision with the correcting glasses.

Thus the basis of our estimate was a purely "*Objective Method.*"

From the cases referred to we have eliminated any in which the strabismus was due to paralysis of the external rectus; and we have usually separated in the tables the cases of ordinary convergent and of alternating convergent strabismus.

The right eye converged in 53 per cent. of the cases, the left in 47 per cent.

I. As to the proportion of cases in which the refraction was similar and different in the two eyes—

Refraction the same in both eyes	107
Refraction different in the two eyes	98

These cases include both alternating and ordinary cases. We have considered the refraction to be different in the two eyes only when either the spherical or the cylindrical error in the two eyes differed by at least 1 D.

II. As to the refractive character of these 410 eyes—

Both eyes were myopic in one case.

The squinting eye was myopic or mixed astigmatic in five cases, whilst the non-squinting eye was either hyper-

metropic (2 cases), hypermetropic and astigmatic (2 cases), or emmetropic (1 case).

The cornea of the squinting eye in some of these five cases was nebulous. Both eyes were hypermetropic or hypermetropic and astigmatic in the remaining 199 cases. Thus of 205 cases, in only two could the influence of hypermetropia in causing strabismus be positively excluded.

III. As to the nature of the difference in the cases in which the refraction in the two eyes was dissimilar—

In 98 cases the refraction in the squinting and non-squinting eyes differed by more than 1 D. either of spherical or cylindrical error.

These cases include 10 cases of alternating strabismus. Of these 10 the two eyes differed as follows:—

In 5 one eye only was astigmatic.

In 3 one eye was more astigmatic than the other.

In 2 one eye was more hypermetropic than the other.

Of the 88 cases of ordinary convergent strabismus, the squinting differed from the non-squinting eye as follows:—

In	7	in the squinting eye there was		no astigmatism.
In	24	„	„	„ astigmatism.
In	15	„	„	„ more astigmatism.
In	8	„	„	„ less astigmatism.
In	18	„	„	„ more hypermetropia.
In	11	„	„	„ less hypermetropia.
In	5	„	„	„ myopia or mixed astigmatism.

IV. As to the average amount of the dissimilarity in the refraction between the two eyes—

In 81 of the cases in which the refraction of the two eyes differed, and in which observations were sufficiently accurate, the average amount of hypermetropia present in the squinting eye was 4·3 D., and the average amount of

astigmatism present (65 cases) was 1·7 D. In the non-squinting eye the average amount of hypermetropia present (81 cases) was 4·1 D., and the average amount of astigmatism present (65 cases) was 1 D.

Thus it will be seen that although the amount of hypermetropia in the two eyes was nearly the same, the squinting was distinctly more astigmatic than the non-squinting eye.

V. Taking all the cases together—

In 29 cases of alternating convergent strabismus the average amount of hypermetropia was 3·5 D. in one eye and 3·4 D. in the other, while the average amount of astigmatism (20 cases) was 0·9 D. in the one eye and 1·2 D. in the other.

Taking the cases of ordinary convergent strabismus—

The average amount of hypermetropia in the squinting eye (107 cases) was 4·1 D.; in the non-squinting eye 3·9 D. The average amount of astigmatism in the squinting eye (98 cases) was 1·6 D., in the non-squinting eye 1·1 D.

In a future paper we intend to publish the conclusions we have drawn from these figures which have been obtained by the objective examination of the refraction of the eyes, in a large number of cases of convergent strabismus.

SOME OF THE COMPLICATIONS AFTER EXTRACTION OF CATARACT.

By E. Treacher Collins, *Senior House Surgeon.*

In my capacity of House Surgeon I have had entrusted to me the after treatment of all cases of extraction of cataract, and have consequently during the last two years had ample opportunity of observing the more usual complications.

Of all these complications, the most fatal is suppuration; it is so rapid and unexpected in its onset and so intractable to any form of treatment. I have thought therefore that by collecting a large number of these cases, and then comparing and contrasting them, it might be possible to gain some indication as to its causes and the treatment for its prevention. With this view I have tabulated the following 50 cases taken from the Hospital case books for several years past.

Besides the more usual complications, I have had some exceptional ones which I will here record in full. These were, first, a series of cases in which, after the completion of the operation, some solution of the biniodide of mercury was injected into the anterior chamber for the purpose of rendering the parts aseptic, with the result that a permanent opacity of the cornea was set up, and vision consequently only slightly improved by the operation; and, secondly, a series of cases which for want of a better name may be termed glaucoma after extraction, and of which I have not been able to find any mention in our text-books.

Number.	Name.	Age.	Date of operation.	Condition of eye and patient previous to operation.	Operation.	Manner and date of commencement of suppuration.	Result.
1	Elizabeth T.	68	Oct. 30	Pain in eye for last four months	Lens came away with difficulty; a quantity of soft matter left	2nd day pain, mucopurulent discharge and swelling of lids; suppuration of cornea noted on 8th day	Shrinking globe; sympathetic ophthalmitis.
2	George L.	45	March 3	Preliminary iridectomy; pupil noted to be irregular before iridectomy	Uncomplicated	Pain, œdema of lids, haze of cornea commencing on 13th day, and hypopyon formed the next day	Excision.
3	Sarah P.	65	March 7		Wound enlarged with secondary knife	Pain next day, swelling of lids 2nd day, purulent discharge 3rd day; cornea seen to be suppurating on 4th day	Excision.
4	William S.	62	March 25	Paralytic ectropion of lower lid, epiphora	Uncomplicated	Pain and swelling of lids on 2nd night; note on 5th day says "cornea completely infiltrated"	Excision.
5	John S.	62	April 29		Vitreous lost, lens extracted with scoop; section did not fall well together	Pain and swelling next day; cornea noted to be steamy on 3rd day, and sloughing on 5th day	Closed pupil, bare p.l.

Number.	Name.	Age.	Date of operation.	Condition of eye and patient previous to operation.	Operation.	Manner and date of commencement of suppuration.	Result.
6	John MacK.	63	May 15		Lens soft and milky	3rd day œdema of lids, purulent discharge, and suppurative keratitis	Closed pupil, T.n.; no a.c. V. = shadows.
7	Hugh H.	66	Oct. 24	Catarrh of conjunctiva	Uncomplicated	.. ..	Excision.
8	Matilda G.	51	Jan. 20	Preliminary iridectomy; projection bad; had had increased tension in 1882, and lacrymal regurgitation in 1881	Uncomplicated; scoop used	Pain 2nd night; discharge on 3rd day, and suppuration of cornea noted on the 4th	Excision.
9	Mary Ann W.	70	Feb. 7	Weak and restless	Uncomplicated	Pain and swelling commenced on 2nd night; section noted to be sloughing on 3rd day	Excision.
10	Jane A.	75	Feb. 13	Weak, sleeps badly; preliminary iridectomy; myopic	Cornea flaccid	Purulent discharge and haze of cornea on 4th day, and purulent infiltration on 6th	Excision.
11	Elizabeth K.	42	April 19	Had been getting thin; menorrhagia; preliminary iridectomy	Uncomplicated	Vomited the same evening, free discharge and section opaque 2nd day	Excision.
12	James H.	59	May 17	Nebulæ in both eyes; posterior synechiæ in other eye	Uncomplicated	Pain on 2nd day; cornea noted hazy on 5th day, and sloughing on 6th	Excision.

Number.	Name.	Age.	Date of operation.	Condition of eye and patient previous to operation.	Operation.	Manner and date of commencement of suppuration.	Result.
13	Tabitha C.	56	June 5	Stye and conjunctivitis noted three months previous	Uncomplicated	Pain and swelling 2nd day, and on 3rd day cornea seen to be infiltrated throughout	Excision.
14	John L.	68	July 4	Lacrymal obstruction and lippitudo	Uncomplicated	Pain, redness, and swelling of lids, and suppuration of cornea next day	Excision.
15	Joseph W.	81	July 23		Uncomplicated	Pain and discharge commenced on 3rd day; on 4th day cornea clear; 5th cornea dull, and the evening of 5th opaque at seat of section	Excision.
16	Mary W.	81	July 24	Lacrymal obstruction	Canaliculus slit and duct probed and washed out immediately previous to extraction; cornea flaccid	On the 2nd evening pain, discharge, and redness of lids; 3rd day whole cornea opaque and hypopyon	Excision.
17	J. S.	75	Sept. 14		Uncomplicated	Pain on the 2nd night; on 7th day hypopyon section noted healthy; on the 9th dulness of cornea	Closed pupil; shrinking globe.

Number.	Name.	Age.	Date of operation.	Condition of eye and patient previous to operation.	Operation.	Manner and date of commencement of suppuration.	Result.
18	Mary B.	59	Oct. 18	Conjunctivitis in February, T.— ? myopic	Uncomplicated	Bronchitis came on on 9th day; discharge, dulness of cornea, and hypopyon on the 11th day	Excision.
19	Eliza H.	75	Nov. 15	Weak	Cornea flaccid; vomited after operation	Discharge and cornea opaque at seat of section on 2nd day	Excision.
20	James K.	60	Nov. 28		Uncomplicated	On 2nd day swelling of lids, pain and discharge; cornea noted yellow on 5th day	Excision.
21	James F.	61	April 4	Preliminary iridectomy; slight conjunctival catarrh	Vitreous lost	Swelling and pain next day; wound yellow 3rd day	Excision.
22	Thomas P.	61	April 30	Had been in infirmary five months and in hospital a week on account of a cold previous to operation; intemperate	Vitreous lost	Wound seen to be hazy the same evening, and yellow the next day	Excision.
23	Charles C.	67	May 28	Eyes noted to be bloodshot and puncta everted in March; preliminary iridectomy	Uncomplicated	Slight conjunctivitis on 7th day; on 8th pain, swelling, and infiltrated ring of suppuration behind cornea, (?) on iris and hypopyon	Excision.

Number.	Name.	Age.	Date of operation.	Condition of eye and patient previous to operation.	Operation.	Manner and date of commencement of suppuration.	Result.
24	Richard D.	58	Oct. 24	From the workhouse; old wound of cornea and iris; diarrhœa previous to operation	Uncomplicated	Commenced with discharge, pain, and swelling on 2nd day	Excision.
25	William C.	70	Oct. 28	When working used to drink six or eight pots of beer daily	Uncomplicated	Discharge and pain on 2nd day; cornea infiltrated on 4th day	Excision.
26	Elizabeth H.	73	Nov. 14		Brussels operation uncomplicated	Chemosis, pain, and infiltration of cornea commenced next day	Excision.
27	Anne A.	60	Nov. 14; same day as Case 26		Brussels operation uncomplicated	Iris prolapsed; cornea steamy; chemosis and pain next day	Excision.
28	Emma P.	72	Dec. 10		Uncomplicated	On the 2nd day pain and discharge; on the 3rd cornea infiltrated and yellow	Excision.
29	Martha T.	72	Jan. 2	Lacrymal obstruction	Uncomplicated	Discharge and pain commenced the 1st day; cornea affected 2nd day	Excision.

Number.	Name.	Age.	Date of operation.	Condition of eye and patient previous to operation.	Operation.	Manner and date of commencement of suppuration.	Result.
30	William C.	67	Feb. 23	From the workhouse	Uncomplicated	Swelling, pain, and discharge 1st day; cornea affected 2nd day	Excision.
31	Eliza A.	67	Nov. 4	Preliminary iridectomy	Uncomplicated	Discharge and pain commenced on the 2nd day; cornea noted to be affected on 5th day	Excision.
32	Maria K.	65	Nov. 27	Central leucoma and iris adherent; preliminary iridectomy	Uncomplicated	Swelling, pain, and discharge 1st day; cornea hazy 2nd day	Excision.
33	Annie C.	45	Jan. 12		Uncomplicated	Was doing well up to 7th day, then pain commenced and iritis; next day there was an hypopyon and infiltration of cornea	Excision.
34	Richard S.	48	March 29	Diabetes two years; very thin	Uncomplicated; a large quantity of soft matter removed after nucleus	2nd day slight discharge, 3rd day infiltration of cornea and hypopyon	Closed pupil, T.n. V. = Hand movement.

Number.	Name.	Age.	Date of operation.	Condition of eye and patient previous to operation.	Operation.	Manner and date of commencement of suppuration.	Result.
35	Mary L.	58	April 5		Uncomplicated	Discharge and swelling of lids 2nd day: infiltration of cornea and chemosis 3rd day	Shrinking globe.
36	Richard D.	62	April 9, 1 year and 5 months after other eye	The second eye of Case 24; nebulæ, from the workhouse	Uncomplicated	Commenced with pain, swelling of lids, and discharge on 2nd night; yellow infiltration of cornea noted on 3rd day	Shrinking globe.
37	Henry J.	73	April 22		Uncomplicated	Discharge and infiltration of cornea 2nd day	Excision.
38	Mary P.	72	May 12	Conjunctivitis a week before operation	Uncomplicated	Discharge and infiltration of cornea commenced 2nd day	Shrinking globe.
39	Thomas P.	69	June 9	Nebulæ; preliminary iridectomy	Uncomplicated	Swelling and discharge on 3rd day, cornea infiltrated on 4th day	Excision.
40	Abigail J.	64	June 18	Nebulæ; lacrymal obstruction in other eye; projection defective	Brussels operation, uncomplicated	Pain, discharge, and infiltration of cornea 2nd day; hypopyon, 4th day	Closed pupil, T.n. V. = Hand reflex.
41	Ann S.	55	June 23	Corpulent; yellowish sclerotic; blepharitis in April	Bulky lens; incisions small	Discharge, swelling of lid, and infiltration of cornea commenced 3rd day; no pain	Closed pupil, T.n.

Number.	Name.	Age.	Date of operation.	Condition of eye and patient previous to operation.	Operation.	Manner and date of commencement of suppuration.	Result.
42	Elizabeth W.	60	Sept. 1	Feeble	Uncomplicated	Discharge commenced on 5th day, pain, swelling of lids, and infiltration of cornea on 6th day	Excision.
43	Edward D.	53	Dec. 10		Uncomplicated	Diarrhœa two days after operation, discharge and pain commenced on 8th day, corneal infiltration on 9th day; a blister that formed spontaneously on hand suppurated	Excision.
44	John H.	66	Feb. 7		Uncomplicated	Discharge; infiltration of cornea and hypopyon first noticed on 5th day	Shrinking globe.
45	Henry A.	63	May 5	Anæmic	Uncomplicated	Commenced with iritis on 5th day, swelling of conjunctiva on the 6th, and hypopyon formed on the 9th day	Excision.
46	George R.	76	June 2	Myopic	Uncomplicated	Pain the first night, discharge and haziness of wound next morning. Purulent infiltration 2nd day	Excision.

Number.	Name.	Age.	Date of operation.	Condition of eye and patient previous to operation.	Operation.	Manner and date of commencement of suppuration.	Result.
47	Richard D.	67	June 8	Old choroiditis in the other eye	Small escape of vitreous	Commenced with discharge on the 1st day; swelling of lids and opacity of cornea, 2nd day	Excision.
48	Caroline G.	63	July 21	Morgagnian cataract	Uncomplicated	Pain the 1st night, swelling of lids, discharge, and yellow infiltration of cornea commenced 2nd day	Excision.
49	Caroline G.	63	Nov. 23; 4 months after the first eye	The second eye of Case 48; acute glaucoma at time of operation	Uncomplicated	No pain at all; slight discharge the 1st day, and purulent infiltration of wound the 2nd night	Shrinking globe.
50	Hannah B.	67	Oct. 27	From the workhouse, no p.l. in the other eye	Uncomplicated	Pain on the 2nd night, swelling, redness of lids, and infiltration of cornea on 3rd day	Shrinking globe.

1. *Age.*—The ages of the above cases may be summarised as follows:—

Between	30	and	50,	4	or 8	per cent.
,,	50	,,	60,	8	,, 16	,,
,,	60	,,	70,	25	,, 50	,,
,,	70	,,	80,	11	,, 22	,,
,,	80	,,	90,	2	,, 4	,,

I have taken to compare with these the ages of 300 consecutive cases of extraction in 1886, thus:—

Between	30	and	50,	41	or 13·6	per cent.
,,	50	,,	60,	65	,, 21·6	,,
,,	60	,,	70,	113	,, 37·6	,,
,,	70	,,	80,	74	,, 24·6	,,
,,	80	,,	90,	7	,, 2·3	,,

These figures seem to prove that there is a greater tendency to suppuration in old people than in young, but they also seem to show that this tendency is greater between 60 and 70 than between 70 and 80; though it is certainly greater between 80 and 90 than between 60 and 70.

2. *Season of Year.*—I have arranged in two parallel columns the number of suppurations according to the month in which they occurred, and the total number of cases of extraction in each month in the year 1886:—*

	Suppuration.	Extractions in 1886.
January	3	32
February	4	15
March	4	19
April	7	27
May	5	45
June	6	31
July	4	17
August	0	16

* It must be borne in mind that the suppurations were spread over several years, while the extractions tabulated here were all performed in one year: the columns cannot therefore be compared except in the manner employed by the author.—(Ed.)

	Suppuration.	Extractions in 1886.
September	2	21
October	6	42
November	7	32
December	2	20

If the number of cases in the six winter months, viz., January, February, March, October, November, and December, be added together and compared with those in the six summer months, viz., April, May, June, July, August, and September, we find that in the former 26 suppurations occurred, while there were 160 cases of extraction in the corresponding period of 1886; and in the summer months there were 24 suppurations as compared with 157 cases in 1886. I think this proves that suppuration has no relation to the time of year at which the operation is performed.

3. *General Condition of Patient, and Ocular Complications.*—My next column describes the condition of the eye and of the patient previous to the operation. In 25 of the cases there was nothing detected, nor was there any suspicion that there was anything wrong in the eye. Of the remaining 25, 6 had some lacrymal complication, 5 had conjunctivitis, 1 blepharitis, 6 nebulæ of the cornea (some of these with synechiæ), 1 posterior synechiæ alone, 1 had acute glaucoma, 2 myopia, 1 choroiditis in the other eye, 1 no perception of light in the other eye, and 1 had had pain in the eye for four months previous to operation.

With regard to their general health, 5 of them were from the workhouse, 6 were noted to be weak or anæmic, 2 intemperate, and 1 diabetic.

In two of the patients both eyes suppurated, and are recorded in the table as four cases.

Those cases with lacrymal complication, conjunctivitis, and blepharitis may be put down as caused by infection; are the remaining 38 also due to infection introduced at the time of the operation by the instruments or operator?

I think not all of them. In some I believe that the corneal flap sloughed from want of sufficient nutrition, and that the inflammation which followed may have afterwards become septic, but that in the first place suppuration started without any infection. My reasons for this belief are the following:—

1st. That in two patients both eyes suppurated, though in both strict antiseptic precautions were taken, and in cases 24 and 36 there was an interval of 1 year and 5 months between the operations on the two eyes, and in cases 48 and 49 an interval of 4 months.

2nd. A large proportion of the 50 cases had nebulæ of the cornea or other evidence or suspicion of past inflammation, by which the nutrition of the cornea or eye would be impaired.

3rd. That several of the patients were from the workhouse, or in a feeble state of health at the time of operation.

4th. That the old have been shown to be more liable to suppuration than the young.

5th. That the old flap incision in which a large section of the cornea was made, was abandoned in favour of Von Graefe's operation, partly because it was found that there was less tendency to suppuration in the latter.

6th. Because the cornea is a fibrous structure and further removed from the blood-vessels than almost any other tissue.

4. *Operation.*—The operation was a modified Von Graefe's extraction in all except three of the cases, in which a Brussels operation was performed. Nine of the cases had had a preliminary iridectomy; in 43 the operation was uncomplicated; in 4 vitreous was lost; in 3 the incision was too small, and in one of these it had to be enlarged with a secondary knife. The proportion of

suppurations after the Brussels extraction was large, as this form of operation was but rarely performed. The proportion after preliminary iridectomy was also large, though this may be accounted for by the fact that a preliminary iridectomy was often performed as a precautionary measure in unfavourable cases.

5. *Manner and Date of Commencement of Suppuration.*—In the majority of cases the symptoms of suppuration commenced on the 1st, 2nd, or 3rd day, but in 8 of the 50 cases they did not appear until on or after the 5th day, and in one of these not until as late as the 13th day. Some of the late cases, I think, commence as an iritis, the intensity of the inflammation being so great that pus is thrown out from the iris, and an hypopyon formed; we know that this sometimes occurs when no perforation of the cornea has taken place, the infiltration of the cornea being then secondary to the iritis. Case 33 is a typical one of this sort; the patient was doing perfectly well up to the 7th day, and the wound had apparently healed,

Number.	Name.	Date of admission.	Age.	Condition of eye previous to operation.	Condition of lacrymal apparatus on admission.
1	Isaac B.	Jan. 16, 1886	71	R. Immature cataract; V. = J. 16	Lower canaliculus had been previously slit; still some regurgitation
2	Mary Ann H.	Jan. 30, 1886	55	R. Mature cataract; pupil active; V. = p.l.; projection good	Some regurgitation from lacrymal sac, and a scar in the skin over the seat of the sac; 33 years ago a lacrymal abscess opened

when an acute attack of iritis set in, in the evening of the same day there was an hypopyon, and the next day the cornea was infiltrated.

6. *Treatment.*—On looking at the last column, it will be seen how unsatisfactory is the treatment of these cases. In 13 of the 50 cases suppuration was checked, but in 8 of these the globe was noted to be shrinking; the remaining 5 had normal tension but closed pupils.

Six of the 50 cases as I have said had some lacrymal complication; if this is detected previous to extraction, what measure can be taken to prevent a disastrous result? Mr. Streatfeild* and others have recommended the total obliteration of the lacrymal sac, the canaliculi, and all the lacrymal mucous surface with the actual cautery. In the following consecutive eight cases a less heroic procedure was adopted with success:—

* "On a Preliminary Precaution to be taken in cases of Cataract Extraction, when there is or has been any Lacrymal Obstruction or Catarrh," see Trans. Ophth. Soc., vol. iv.

Treatment previous to operation.	Operation.	Treatment after operation.	Result.
Two hours previous to operation lacrymal duct and sac syringed out with Boracic acid lotion	Uncomplicated	Dressed twice daily (first dressing changed the same evening) with Unguentum Acidi Borici, and the lids bathed with some Condy's fluid and water	Feb. 1, V. = $\bar{c}$ + 10. $\frac{20}{30}$ + 14 J.1.
Lower canaliculus slit, and duct probed; the lacrymal sac and duct were afterwards syringed out daily for 17 days with Boracic acid lotion	Uncomplicated	Dressing same as in Case 1	April 16, R. needled, after which V. = $\bar{c}$ glasses $\frac{20}{20}$ partly and J.1; Oct. 30, again admitted with sympathetic ophthalmitis in L., the vision of R. remaining good.

Number.	Name.	Date of admission.	Age.	Condition of eye previous to operation.	Condition of lacrymal apparatus on admission.
3	Nathaniel S.	Feb. 14, 1886	69	L. Adherent leucoma; opaque lens; V. = hand movement R. Shrunken globe	Ectropion of lower lid, and lacrymal obstruction
4	Mary T.	Aug. 7, 1886	53	R. Mature cataract; pupil active; V. = hand reflex; projection good	Note on May 25, 1885. R. canaliculus slit 4 years ago, not probed for 3 years; pus has again collected; numbers 3 and 5 passed very tight; on admission some regurgitation from lacrymal sac
5	Abigail J.	Oct. 1, 1886	65	L. Mature cataract; pupil active; nebulæ of cornea; V. = fingers at 2 feet; projection good	Lower canaliculus previously slit; slight regurgitation
6	George T.	Jan. 7, 1887	66	R. Mature cataract; pupil active; hand reflex; projection good	Chronic dacryocystitis
7	Rebecca S.	March 2, 1887	53	L. Mature cataract; pupil active; hand reflex; projection good	Lower canaliculus had been previously opened; regurgitation on pressing sac
8	Caroline A.	Oct. 1, 1887	57	R. Mature cataract; pupil active; hand reflex; projection defective below	Chronic dacryocystitis

Treatment previous to operation.	Operation.	Treatment after operation.	Result.
Feb. 18, lower canaliculus slit, and duct probed; lacrymal sac and duct syringed with Boracic acid lotion just previous to operation	Feb. 11, iridectomy upwards and inwards; April 15, extraction uncomplicated	Dressing same as in Case 1	Good.
Two hours previous to operation lacrymal duct and sac syringed out with Boracic acid lotion	Uncomplicated	Dressing same as in Case 1	Oct. 9, V. = $\bar{c}$ + 13 $\frac{20}{50}$ + 17 J. 4.
Lacrymal sac and duct syringed out on alternate days with Boracic acid lotion for 12 days previous to iridectomy, and for 13 days previous to extraction	Oct. 31, preliminary iridectomy; April 22, extraction uncomplicated	Dressed with a pad of Alembroth gauze tissue, first dressing changed the same evening; lids bathed with Lotio Hydragyri Perchloridi, and Unguentum Iodol applied to the margins, and twice daily afterwards	May 2, $\bar{c}$ + 15, the time by a watch: illiterate.
Lower canaliculus slit; duct and sac syringed alternate days with Boracic acid lotion for 11 days previous to iridectomy, and for another 11 days previous to extraction	Jan. 19, preliminary iridectomy; April 2, extraction uncomplicated	Dressing same as in Case 5	Good.
Lacrymal duct and sac probed and syringed daily with Boracic acid lotion for 5 days previous to extraction	Uncomplicated	Dressing same as in Case 5	Knocked her eye on the sixth day, and had some hæmorrhage into the anterior chamber, otherwise progressed favourably.
Lower canaliculus slit; lacrymal duct and sac probed and syringed with Boracic acid lotion daily for 9 days previous to extraction, and an iodoform style inserted just before	Uncomplicated	Dressing same as in Case 5.	Good.

The chief points in the treatment of these eight cases were, the syringing of the lacrymal sac and duct with an antiseptic lotion and the frequent dressing and bathing after the operation. The syringe used had that part that passes down the duct shaped like a lacrymal probe, and about the size of a number 5, with several perforations on all its sides but none at the end; to this was attached an apparatus similar to a Higginson's syringe. By this means a large quantity of lotion was easily injected. I think the passing of an iodoform style immediately before the operation, as was done in Case 8, an additional precaution.

Since the biniodide of mercury is rapidly coming into use as an antiseptic, and since it has been strongly recommended as a lotion in cases of extraction of cataract by Professor Panas, the following cases are of interest:—

Case I.—John L., æt. 66. Admitted December 3rd, 1885.

Right eye. Mature cataract; sight failing seven months. V. = fingers at 1 foot; projection good; pupil normal.

Left eye. Immature cataract; sight failing three months. V. = $\bar{c} -5 \frac{20}{70}$.

December 4th. R. Extraction, under cocaine. Operation uncomplicated. Anterior chamber after completion of operation washed out with a solution of biniodide of mercury, 1 in 25,000.

December 9th. Opacity of cornea noted.

December 24th. The opacity of the cornea still present; it is striated, whitish, with clear spaces left here and there; more marked at the centre and upper part than the lower.

May 13th, 1886. There is still a general haze of the cornea, and a white opacity at the upper part; the epithelium of the surface looks rough and finely granular.

A cataract was subsequently extracted from the L. eye; the anterior chamber was not washed out, and a good result was obtained.

Case II.—Charles D., æt. 44. Admitted November 19th, 1885.

Right eye. Has had a cataract extracted successfully six months ago.

Left eye. Nearly mature cataract. V. = hand reflex; projection good; pupil active.

November 20th. L. Extraction, under cocaine; operation uncomplicated. Anterior chamber washed out with a solution of biniodide of mercury, 1 in 25,000.

December 1st. A white infiltration of cornea, extending downwards from the wound.

December 18th. Opacity of cornea still continues.

Case III.—Ann M., æt. 55. Admitted November 19th, 1885.

Right eye. Mature cataract. V. = hand reflex; projection good; pupil active.

Left eye. Opacities in lens. V. = $\bar{c}$ +1·5 $\frac{20}{70}$.

November 20th. R. Extraction, under cocaine; operation uncomplicated. Anterior chamber washed out with a solution of biniodide of mercury, 1 in 25,000.

November 27th. White opacity of cornea extending downwards from wound.

December 14th. Opacity still continues.

November 1st, 1886. Still a haze of cornea, extending from cicatrix of incision. V. = $\bar{c}$ + 10 $\frac{20}{100}$.

The left cataract was extracted, and a good result obtained; the anterior chamber was not washed out, and there was no opacity of the cornea.

March 7th, 1887. A white opacity in the posterior surface, at the upper part of the right cornea. V. c $\frac{+11}{+2 \text{ cyl.}}$ 80° down and in = $\frac{20}{70}$, and $\frac{+15}{+2 \text{ cyl.}}$ 80° down and in, 8 J.

March 8th. R. Needled, under cocaine.

March 13th. The haze of cornea has increased. V. c glasses as above $\frac{20}{200}$ only, unimproved.

Case IV.—Eliza G., æt. 55. Admitted November 5th, 1885, suffering from diabetes and with mature cataract in the left eye. V. = fingers at 2 feet, and a commencing cataract in right eye. V. = $\frac{15}{200}$.

November 6th. L. Extraction, under cocaine; operation uncomplicated. Anterior chamber washed out with a solution of biniodide of mercury, 1 in 25,000.

November 16th. Anterior chamber has not re-formed.

November 20th. A shallow anterior chamber and a milky-white opacity of the cornea.

December 7th. Opacity of cornea still continues.

February 22nd, 1886. A general haze of cornea and roughness of epithelium and vertical striæ.

Case V.—George S., æt. 41. Admitted November 11th, 1885.

Right eye. Operated on last June. V. = c $+11\ \frac{20}{30}$ +15 1 J.

Left eye. A nearly mature cataract. V. = fingers at 3 feet; projection good; pupil active.

November 13th. L. Extraction, under cocaine; operation uncomplicated. Anterior chamber washed out with a solution of biniodide of mercury, 1 in 25,000.

November 20th. Slight striated haze of cornea, extending downwards from wound.

November 27th. Haze still continues; a thick opaque membrane in the pupil.

June 8th, 1886. L. Needled, under cocaine.

May 19th, 1887. Haze of cornea and new vessels in it; opaque membrane in coloboma and iris bombé. T. n. V. = hand-reflex.

November 7th. Haze of cornea and superficial ulceration in the centre. V. = hand movement; eye very painful.

November 8th. L. excision.

There can be no doubt that the keratitis in these cases was set up by the biniodide of mercury solution which was injected into the anterior chamber, for in all the cases it was noticed when first the eye was looked at after the

operation, and those four patients who had the cataract extracted from the other eye, when the anterior chamber was not washed out, obtained a good result and had no keratitis. The opacity caused has also some special characteristics of its own, in which it differs from the ordinary striated keratitis sometimes seen after operations on the cornea; it has a peculiar milky-white appearance, and is seen to be chiefly at the posterior surface, though afterwards in some of the cases was added to this a superficial roughness, then again it is permanent, at any rate it has not cleared up yet in any of the cases, and it has lasted two years and appears not amenable to treatment.

Increased tension after extraction of cataract may be brought about in different ways. 1. It may occur after there has been a severe attack of iritis, which has led to the formation of a membrane with numerous posterior synechiæ, and to closure of the pupil, a bombé condition of the iris and increased tension. 2. It may occur in connection with that form of iritis which sometimes follows on extraction, and which is characterised by a deep anterior chamber and dotted opacities of the cornea. 3. There is a third form of increased tension after extraction in which there is not any or only slight iritis, no blocking of the pupil, and no increase in the depth of the anterior chamber or keratitis punctata. The following cases belong to this last class:—

Case I.—Mary Ann D., æt. 70.

Admitted December 6th, 1884. Mature cataract in both eyes; sight failing in left five or six years; shadows; projection good; in right two years; shadows; projection good.

December 10th, 1884. L. Extraction; cocaine; modified Graefe, uncomplicated.

December 29th. L. V. $= \bar{c} + 10\,\frac{20}{200} + 14$ J. 16.

Feb. 25th, 1885. L. V. $= \bar{c}\,\frac{+\ 6 \text{ spherical}}{+\ 11 \text{ cylinder axis horizontal}} = \frac{20}{50}$.

$$\frac{+\ 10 \text{ spherical}}{+\ 11 \text{ cylinder axis horizontal}} = \text{J. 1.}$$

Soon after she obtained these glasses the sight gradually became dim, and she noticed rings of coloured light around lamp lights.

March 13th, 1886. L. Cornea steamy and bulged forwards; pupil dilated. T. +2. Optic disc indistinctly seen, cupped, and very oblong; can count fingers at one foot distant. The right eye was subsequently operated on and a good result obtained.

Case II.—Joseph H., æt. 48. Senile cataracts in both eyes. Projection good and T. n. Left operation on June, 1885, and V. $\bar{c}$ glasses afterwards $\frac{20}{20}$ and J. 1.

August 4th, 1885. R. Extraction, cocaine, modified Graefe's uncomplicated; a large amount of soft matter left.

August 31st. A large quantity of opaque matter in coloboma.

September 20th, 1886. R. Limbs of coloboma adherent to corneal cicatrix; a thick opaque membrane in coloboma also adherent to cicatrix; T +2; no p.l.; no pain.

Case III.—Sarah B., æt. 60.

June 23rd, 1885. R. and L. opacities in lenses; good perception and projection. T. n.

August 7th. L. Preliminary iridectomy, cocaine.

November 3rd. L. Extraction, cocaine, uncomplicated.

September 9th, 1886. L. Both limbs of coloboma adherent to cornea; capsule in coloboma also adherent to cicatrix; optic disc could not be seen through it. V. = $\bar{c}$ + 10 $\frac{5}{200}$, unimproved with cylinders, estimated to have about 6 D. of astigmatism by retinoscopy; T. + 1, field tested roughly appeared normal.

September 10th. L. Needled; needle passing through old cicatrix in cornea left by extraction.

September 11th. L. T. n.

September 20th. L. Needle puncture has not closed; aqueous leaks through it; T. + 1.

September 24th. L. Descemet's membrane or lens capsule bulging into needle puncture.

February 24th, 1887. L. T. + 2; V. = hand movement only; projection defective, the part of the cornea lying between the

upper margin and the cicatrix appears to have stretched and bulged.

April 21st. L. V. = hand movement; T. +3. The cataract was subsequently extracted from the right and a good result obtained.

Case IV.—Eliza C.

May 26th, 1887. Senile cataract both eyes; L. complete; V. = hand movement; projection defective on inner side; R. incomplete; V. = J. 10.

May 27th. L. Extraction, cocaine, modified Graefe's operation, uncomplicated.

June 4th. L. Wound not completely closed; good anterior chamber; pupil well dilated; patient complained of pain in head and eye.

June 16th. L. V. = $\bar{c} + 14\frac{10}{200}$, and J. 18.

August 3rd. L. T. full; optic disc well seen, not cupped; slight bulging of wound; pupil well dilated; limbs of coloboma free; capsule adherent to cicatrix (?).

Sept. 13th. L. V. = $\bar{c}$ $\frac{+10 \text{ spherical}}{+ 8 \text{ cylinder axis horizontal}}$ $\frac{20}{30}$ partly.

$\frac{+14 \text{ spherical}}{+ 8 \text{ cylinder axis horizontal}}$ J. 1, slowly.

Sept. 20th. L. T. +; eye ached.

Sept. 26th. L. V. = with combination as above $\frac{20}{50}$ partly; cornea bulged; T + 1; no cupping of optic disc; field contracted.

Sept. 27th. L. Sclerotomy upwards.

Sept. 30th. L. T. n.

Oct. 4th. L. Cystoid cicatrix, T. +2.

Oct. 10th. V. = with same combination as above, $\frac{20}{70}$ and J. 10, unimproved.

That glaucoma should come on in an eye that has had a large iridectomy performed, and from which the lens has

been removed without the occurrence of any iritis, is so remarkable, that I think these cases worthy of special note. In three of the four cases the other eye had been or was subsequently operated on, and a good result obtained without any increase of tension; the inference from this I think is that it was something special in the operation itself, and not any peculiarity on the part of the patient, that was the primary cause of the glaucomatous symptoms. It will be also seen that in Cases 2 and 3 both limbs of the coloboma were noted to be adherent to the cicatrix, and not only the limbs of the coloboma but the lens capsule as well; in Case 4 also the lens capsule was probably adherent; but in Case 1 there is no note of any adhesion, though not having at that time been impressed with the importance of looking for it, I may not have mentioned it. Do these facts suggest any way in which the escape of fluids from the eye might be interfered with? I think they do, the dragging forward of the iris by the adhesion of the limbs of the coloboma to the cornea would tend to close the angle of the anterior chamber, and so obliterate the canal of Schlemm, and the adhesion of the lens capsule to the cicatrix might obliterate it above in the space left by the coloboma, and thus not only destroy the good effect of the iridectomy, but also assist in dragging forwards the iris. The obstruction thus set up to the outlet of fluids would cause the parts behind the cicatrix to bulge, as was specially noted in Cases 3 and 4, and this bulging would cause the alteration in the curvature of the cornea, setting up the very high grades of astigmatism seen in Cases 1, 3, and 4.

In conclusion, I have to thank the various members of the surgical staff for their kindness in allowing me to make use of the cases contained in this paper.

CURATOR'S PATHOLOGICAL REPORT.

Four Cases of Orbital Sarcoma in Children.

By J. B. Lawford,

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Case I (*Reg. No.* 1960).—Percy N., æt. 4. Admitted to Moorfields Hospital, under Mr. Tweedy's care, on November 20th, 1885.

On admission: The left eye is protruded forwards, downwards, and slightly inwards. A solid mass can be felt between the globe and the upper orbital margin, and it seems to be slightly moveable. The upper outer angle of orbit is free from growth.

The exophthalmos has been noticed (according to the parents' statement) for two years. The growth has been painless.

On the day of admission the growth was removed, through a horizontal incision along the lower margin of the eyebrow; it was nearly the size of the eyeball, and firm to the feel.

The child left the hospital in a fortnight, the wound being quite healed; there was, however, inability to raise the upper lid more than half way.

This patient subsequently came under the care of Mr. Doyne, of Oxford, to whose kindness I am indebted for the further notes of the case, and also for a portion of the recurrent growth.

On October 30th, 1886, there was a small moveable tumour behind the left upper eyelid, the size of a pea. The boy was not seen again for six weeks, when he came with the left eye dislocated on to the cheek, and the orbit filled with new growth. On removal of the growth, it was found by Mr. Doyne to have an ill-defined capsule, and to contain some pinkish-brown soft matter. This specimen was unfortunately thrown away. The eye returned to its normal position, and sight remained good (the actual visual acuity not known).

A little more than two months later (March 3rd, 1887) a fresh nodule of growth had appeared in the upper lid. On operating this was found to be intimately connected with a

mass of cicatricial and new tissue, extending to the back of the orbit. This was removed as completely as was possible, without enucleating the eyeball, for which the parents' consent had not been obtained.

On April 12th, the eyeball was removed, and the contents of the orbit cleared out; chloride of zinc paste was applied two days later.

In July, a fluctuating swelling was felt behind the lids (? lacrimal retention), which on tapping allowed the withdrawal, on three occasions, of a small quantity of clear fluid.

On October 25th a large mass of new growth was again removed from the orbit, and this Mr. Doyne kindly sent to me. It is an irregular mass of very firm tissue, and has on section a distinctly fibrous appearance. It contained (Mr. Doyne tells me) a small cyst, which was situated at the upper and posterior part, and from which the fluid which was drawn off evidently came.

In December, 1887 (about the 15th), the growth having recurred at the inner and upper part of orbit, another operation was performed by Mr. Doyne, and a nodule removed; the inner wall of the orbit was partially removed, and two small suspicious nodules taken from the nasal cavity.

This operation entirely relieved severe pain in the brow and nose, of which the boy had been complaining.

Microscopical Examination.

(1.) *Of the Original Growth removed November 20th*, 1885.—This consists of a matrix of well-formed fibrous tissue, with connective tissue corpuscles scattered through it. The sarcoma cells, which are mainly oval and spindle-shaped, are generally collected in groups, and are of very varying size. There are, however, areas over which these cells are very sparsely distributed, and in which the appearances are to a great extent those of genuine fibroma. There is no gland structure. The growth has no capsule. In one part, near the margin of the tumour, are numerous rather large thin-walled blood-vessels.

(2.) *Of the Recurrent Growth removed October 25th*, 1887.

—The structure is essentially similar to that above described. The fibrous elements largely predominate, but there are groups of cells, and cells scattered through the stroma, just as in the original growth. These cells are round, oval, and spindle-shaped, the two former kinds being most numerous. The blood-vessels are not very numerous, but are more scattered than in the primary tumour.

(3.) *Of the Recurrent Growth removed December,* 1887.—The proportion existing between the cellular and fibrous elements appears to have changed somewhat in favour of the former. The fibrous tissue has in general very similar characters, but in parts it is not so well formed, and appears less developed than in the previous specimens. The cells are mainly round and oval; the blood supply not very abundant. Altogether this specimen has the appearance of a more rapidly-growing tumour, of a lower type than the two first growths.

Case II (*Reg. No.* 2138*b*).—Rebecca W., æt. 10. Admitted to Moorfields Hospital, under Mr. Lang's care, August 11th, 1886, when the following notes were made:—

Family history good.

Early in June, 1886, the child had had a blow on the right eye by a piece of wood, and in consequence the lids became much swollen. She was brought to hospital as an out-patient on June 8th, and the note then made was, "Hæmatoma of right upper lid." The mother states that before the accident she had noticed "a pimple" on the child's eyelid.

Present condition: At inner upper angle of right orbit is a firm elastic swelling, the size of a walnut, extending deeply, so that its posterior limits cannot be felt. The skin is freely moveable over the growth. The vision of the right eye $= \frac{6}{18}$, with -3 D.

No ophthalmoscopic changes.

August 16th. The tumour was removed in several portions through a horizontal incision in the upper lid. It was not

adherent to surrounding tissues. The wound healed rapidly, and the patient was discharged from hospital on August 25th. Three months later (on November 17th) she was readmitted, with a recurrence of the new growth, behind the inner end of the scar. The tumour now extended from the inner angle, half way across the orbit. Its posterior limit could not be felt. The upper lid drooped, but the skin was moveable over the growth. There were no changes in the eye.

November 18th. The entire contents of the right orbit were removed *en masse*, and after some dissection the position and size of the new growth were ascertained to be as follows :—

The tumour measures roughly 22 mm. antero-posteriorly by 15 mm. transversely, and is situated between the superior oblique and internal rectus muscles, to both of which it is loosely attached. Its anterior end extends forwards under the orbicularis and protrudes the upper lid. The infra-trochlear nerve is stretched over its posterior surface. On the temporal side of the anterior part of the tumour, and close behind the upper lid, is a mass of tough, nearly white cicatricial tissue, which is very closely adherent to the orbicularis muscle and to the tumour. This tissue, in the site of the primary growth, reaches to the mid-line of the upper lid. The new growth has a definite capsule, and has no close adhesions, except as mentioned, to the cicatrix on its outer side. When the capsule is cut the growth, which is soft and spongy, bulges through the incision. The lacrimal gland is quite separate from the tumour, and apparently healthy.

January 16th, 1888. There is at this date no recurrence of the growth.

Microscopical Examination.

Sections of the primary growth removed in August have the structure of a round-celled sarcoma. It is not a very compact growth, that is to say, there is a large amount of intercellular material, in which the cells are rather loosely arranged. This intercellular stroma has a faintly fibrous structure. The cells, which are well formed with a round central nucleus in each, tend to collect in small circular groups, each group containing 8—10 cells.

A delicate capsule is evident on the surface of the tumour, but it is impossible to say if this completely surrounded the growth. A very noticeable feature in the growth is the large size and number of the blood-vessels, which have well-formed and, in some instances, thick walls. No blood extravasations and no pigmentation met with.

Sections of the recurrent growth examined microscopically reveal a structure in many respects similar to that just described. The cells of the tumour are round, but much more closely packed than in the primary growth, and they exhibit no similar grouping.

In a few places there is evidence of a tendency to elongation of the cells.

The capsule of this tumour is a stronger structure than in the primary one, and the vascular supply is much less abundant, though the vessels throughout the growth are fairly numerous.

Case III.—O. J., male, æt. 2. Admitted to the Middlesex Hospital March 1st, 1887, under the care of Mr. Lang, who has kindly given me these notes of the case, and the tumour.

One month previously the child fell and struck his forehead; a week later he tumbled out of his perambulator, and struck the right temple. Muco-purulent discharge from nostril (? R. or L.) 14 days. Abscess in left thumb. Enlarged glands in neck.

Two other children, æt. 4 years and 11 months respectively. Both are healthy.

On admission: The right lower lid is bulged forwards by an irregular lobulated swelling. The eyeball is displaced upwards and forwards. Skin and conjunctiva normal.

March 8th. The growth is larger, and the globe more prominent. There is ecchymosis over the lower lid.

The eyeball was excised, and the growth with the entire contents of the orbit removed. The tumour consisted of an irregularly rounded imperfectly lobulated mass, yellowish in colour, and of firm consistence, measuring roughly 2·5 cm. by 2 cm.

January 16th, 1888. There has been no return of the growth; the orbit is filled with hard cicatricial tissue, which has undergone no change during the last six months. The child is plump and well.

Microscopical Examination.

The tumour is an unpigmented sarcoma, growing in the connective tissue of the orbit. It is not encapsuled. Its cells are generally circular, but in some places oval in shape, and not of uniform size. They are rather loosely set in a finely fibrillated matrix, which does not stain at all. The growth is extremely vascular, containing very numerous large-sized vessels. Many of these (and the largest of them) are merely blood-channels in the substance of the tumour, and have no distinct walls, though showing traces of a thin lining membrane—separating the blood from the sarcoma cells. The majority of the vessels, however, have thick walls, with an indistinctly fibrous structure, and a well-formed endothelium.

Case IV.—Ada E. N., æt. 10. Admitted to St. Thomas's Hospital, under Mr. Nettleship's care, March 30th, 1886.

Family history good.

The child has always been delicate. On February 21st, 1886, the right eye was first noticed to be more prominent than its fellow, and it was "bloodshot." The sight of this eye was also found to be defective.

On March 15th she was seen by Mr. Morton at the S.L.O.H., and with the right eye she could then read $\frac{6}{12}$ and 1 J.

March 23rd. Patient was brought to St. Thomas's Hospital. There was much proptosis of the right eye. Its upward movement was lost, and movements in other directions were much impaired. A firm lobulated mass could be felt in the situation of the lacrymal gland. V. $= \frac{6}{36} - 1$ D. $\frac{6}{18}$ ptly. Oph.: O.D. hazy.

March 30th. More proptosis; conjunctiva œdematous; mass has increased considerably. Pain at back of head and outer

margin of orbit. The whole contents of the right orbit were removed, with the periosteum. The tumour adhered to the bone, but could be peeled off; it was traced to the apex of orbit, from which it appeared to spring. It was very firm to the touch.

May 6th. A recurrence of the growth has appeared in right temporal region, encroaching on outer side of orbit.

May 12th. The tumour in temporal region is rapidly increasing. The child has become unconscious on several occasions lately.

After this date she had frequent epileptiform fits, sometimes onesided, sometimes affecting both sides, with severe headache and vomiting. The growth in the right temporal fossa increased rapidly. Troublesome epistaxis occurred.

June 12th. Died.

Post-mortem Examination by Dr. Sharkey.—The following is a short extract from the notes:—

Over surface of right cerebral hemisphere a thick layer of yellowish lymph with localised thickenings; (?) new growth. Dura mater of right anterior and middle fossæ of skull, is the seat of whitish new growth, and in right sphenoidal fissure, and on surface of right squamous bone is a mass of white homogeneous tumour, involving the periosteum. The bone beneath is rough and eroded, but nowhere perforated. No new growth in right orbit. The parts of the brain corresponding to the new growth are softened. Deposits of new growth were found in front of the bodies of the dorsal and lumbar vertebræ, and in the right pleura.

The growth removed from orbit is as large as a small peach, irregularly oval in shape, and firm to the touch. Its exact relations to the other contents of the orbit could not be made out accurately, as they were necessarily disturbed during removal.

Microscopical Examination.

The tumour is a round-celled sarcoma, unpigmented and unencapsuled. The cells are of small and fairly uniform size, and each contains a large central nucleus. Where spreading into neighbouring tissue, the cells have

an imperfectly columnar arrangement; elsewhere they are rather loosely set in a matrix containing a considerable amount of fibrous tissue; this is probably the orbital fibrous tissue which has been included in the growth. The vascular supply of the tumour is not very abundant, but a certain number of blood-vessels with well-formed walls are found in sections. The place at which or the tissue from which this growth originated, could not certainly be made out. Unfortunately, I did not obtain portions of the new growths in other parts of the body for microscopical examination.

OBSERVATIONS ON TOBACCO AMBLYOPIA.

By Robert W. Doyne,

Surgeon to the Oxford Eye Hospital, and St. John's Hospital, Cowley.

The possibility of toxic amblyopia being limited to one eye has been demonstrated by a case reported by Mr. Jonathan Hutchinson, Jun., in the last volume of the Reports. I believe, however, that hitherto no case has been actually observed; the following, therefore, which has seemed to me to be unequivocal, may be of interest:—

I. *Case of Monocular Central Amblyopia in a Tobacco Smoker.*

Arthur Jones, æt. 38, gamekeeper, a fine, strongly-built, healthy-looking man, came under my observation on July 29th, 1887. He complained that the sight of the right eye had been failing rapidly the last month, so much so that he was unable to work; he could see better early in the morning than in the evening, usually worse midday, presumably, therefore, worse in bright light. His left eye had never failed, and he could see well with it. He denied any illness, nervous shock, alcoholism, or syphilis; there was no pain, or any other subjective symptom. So far as he knew there was no family predisposition to affection of sight in particular, or disease in general. He always smoked between 3 and 4 ozs. of black tobacco a week.

On examination his vision was found to be—

R. $\frac{6}{36}$ and J. 16 with difficulty.

L. $\frac{6}{6}$ and J. 1.

The fields of vision for red and white were uncontracted, but that of the right showed a typical central scotoma for red and green; other colours were not tested.

The discs and maculæ were carefully examined, but nothing abnormal was recognised, saving possibly some congestion of the right disc, as compared with the left.

The pupil reacted readily to direct and associated stimuli of light and accommodation.

There was no evidence of kidney mischief, no manifest symptoms of syphilis. Knee-jerks were normal. He was advised to give up smoking entirely, and was ordered liq. strychniæ, ♏ iv, thrice daily. I saw him again about two months later, but unfortunately have mislaid the notes taken on that occasion; the impression, however, left on my mind by a careful examination was that he was rapidly recovering. I can state positively from memory that the central scotoma in the right field had disappeared, and that the left eye had remained unaffected.

Being anxious to obtain a final record of the case, I wrote repeatedly to him; he as frequently promised to come, as frequently disappointed me. At last, through the intervention of his employer, who told me that he had been drinking rather heavily of late, I saw him again on December 17th. I then learned from him that his left eye had remained unaffected, and that his right had been very much better, but the last week or two had not been quite so well; this he attributed to heavy night work in bad weather. He admitted he had begun smoking again, but a lighter tobacco, and less of it, but denied drinking more than a glass of beer with his meals; the shakiness of his hands, however, combined with the information I had from his employer, led me to a different conclusion. Vision was then—

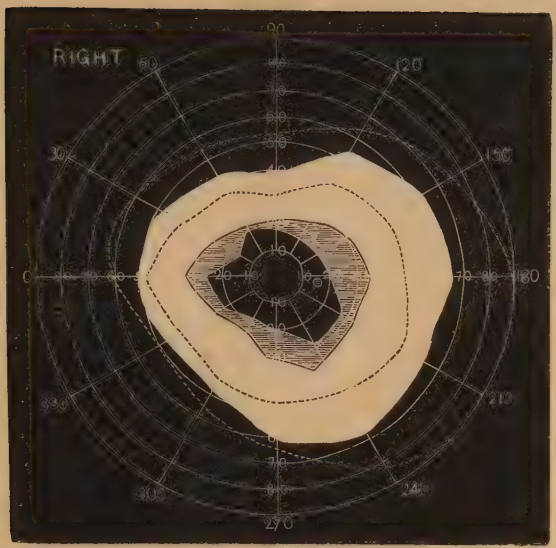
R. $\frac{6}{9}$ very imperfectly, and short words of Jaeger 1.

L. $\frac{6}{6}$ Jaeger 1.

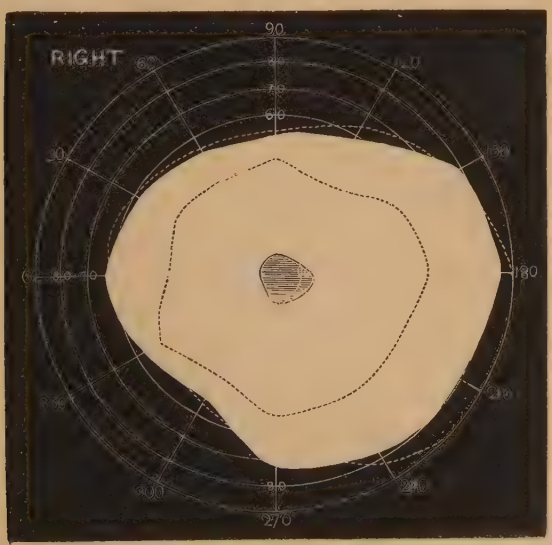
Fields of vision for white and red normal. No trace of failure of central colour perception.

II. *Case of Central Blind Area occurring in a Smoker.*

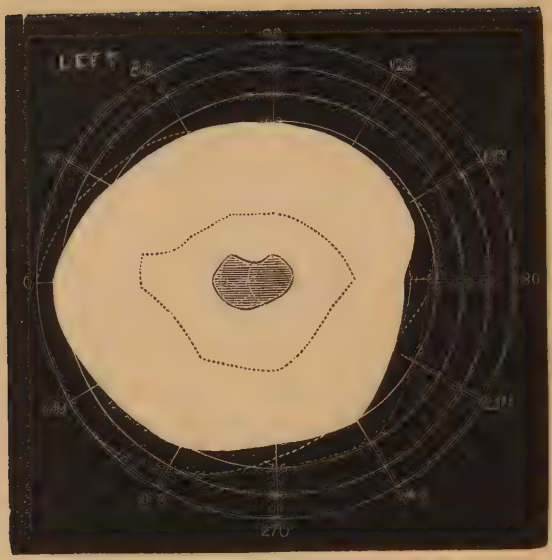
W. H. Smith, æt. 29, cutler, from Sheffield. The patient came under my notice on May 30th of the past year. He gave me the following account of himself. At Christmas time of 1886, after three days' heavy drinking, he had a "fit," and on going to his employment the next day he found he could not see to do his work. He was under treatment for some time in hospitals



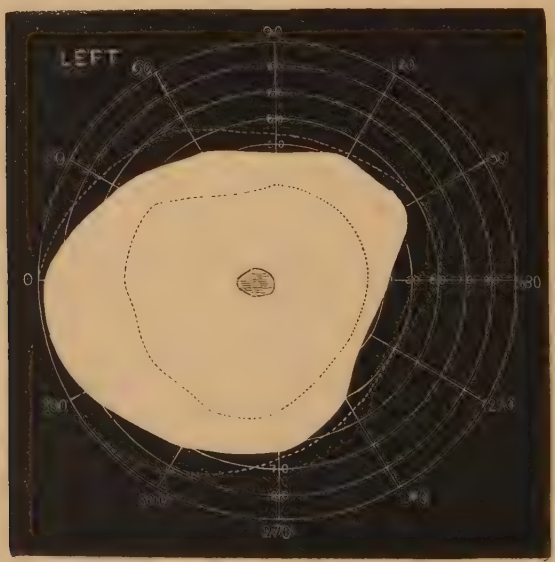
Field of vision on May 30th, 1887. Shows field for white, and inside this a dotted line marks outer limit of field for red. The central dark part represents an area of complete blindness. The scotoma for red extended also over the surrounding shaded area.



Field of vision on June 3rd, 1887. Shows outer limits of fields for white and red. Central shaded area marks out position of colour-scotoma.



Field of vision on May 30th, 1887. Shows outer limits of fields for white and red. Central shaded area represents scotoma for red.



Field of vision on June 3rd, 1887. Still small scotoma for red manifest.

in the north, but his sight continuing to get worse, he made up his mind to tramp to London, to seek relief there. He appears to have visited eye hospitals on his journey south. He had been a very heavy drinker for three years previous to the fit, when he was in work and had money to spend on it, but from force of circumstances had been steady since. He had smoked occasionally before he was 23, but since that age had consumed regularly not less than 3 ozs. of black tobacco a week. He had not been warned against it, but of his own accord had given it up a week or two previously, because he noticed it gave him a pain across his brows, and made him dizzy and stagger as if drunk. He saw best in dull light. He denied syphilis. His sight had been much worse the last few days, when he had been tramping hard in a state of semi-starvation; his boots and appearance fully bore out the latter statement. On examination he presented a gaunt, miserable, debilitated, dissipated appearance; his manner and answers were straightforward, there was no evidence of simulation.

His pupils were not dilated nor contracted, and they reacted to all stimuli. The knee-jerks were active. I have no notes of his urine, but from their absence I have no doubt that it was examined with negative results.

His right field of vision was contracted for white and red, the red not proportionately more so than the white; in the centre of the field was a large area of complete blindness, surrounded by a narrow scotoma for red. The field was necessarily difficult to take, but I can speak positively of its correctness, for I marked out the blind area over and over again with both red and white test discs, with practically the same results, the red disc, whose colour had faded before, disappeared completely at the same points as the white.

His left field was good at the periphery for white, but was somewhat contracted for red, and centrally presented a scotoma for red, but no blind area. (See Charts.)

The ophthalmoscopic examination showed transparent media; discs very pale, their edges very decidedly blurred; vessels of normal size, but the arterial walls were very manifest. No noticeable difference between the two eyes. He could count fingers held close up to his right eye, and with the left read Jaeger 20 held close, but no distant types.

He was admitted into the hospital as an in-patient, and placed on a liberal diet. The right eye was strapped up. I have made no notes of medicinal treatment, possibly none was adopted.

June 1. There was great improvement in the right eye, and some in the left, which was, however, still the better eye of the two.

In right field, blind area had disappeared, replaced by smaller colour scotoma.

V. R. $<\frac{6}{60}$ words of Jaeger 16.
L. $<\frac{6}{60}$ words of Jaeger 16.

Both eyes were strapped up.

June 3. Scotoma much smaller.

V. R. $<\frac{6}{60}$ words of Jaeger 16.
L. $<\frac{6}{60}$ words of Jaeger 16.

June 12. His bed was required for an urgent case, and he was discharged on his road to London, where I afterwards learnt he was under treatment as a "tobacco" case, till lost sight of.

On discharge from the Oxford Eye Hospital vision had improved to—

R. $\frac{6}{60}$ some letters of Jaeger 14.

L. $\frac{6}{60}$ some words of Jaeger 14.

Scotoma still present in both eyes.

In this case I adopted the plan of strapping up the eyes to exclude the light, on the following theory, for which I claim no clinical support,—I have only arrived at it by a process of reasoning and exclusion; a stern critic would doubtless say that I had merely worked out the least common multiple of many possibilities. Admitting

the hypothesis that there exists in the human retina a substance analogous to the visual purple, and that there is produced in it, by the action of light, a chemical change which gives the stimuli conveyed by the nerve fibres to the brain, exciting there visual impressions, I have deduced—

I. That tobacco and perhaps other agents may have a toxic influence on this substance, thereby degenerating it and causing retinal exhaustion, especially in those who are debilitated by any cause, or who may be especially susceptible to its influence.

II. That the exhaustion shows itself in the failure of the more delicate colour sense.

III. That the exhaustion naturally takes place at the point of greatest retinal activity, and where the light is proportionally stronger from the rays being more accurately focussed.

IV. That patients as a rule see better in dull light because there is less retinal exhaustion produced by its action.

In connection with these cases I should like to place on record the fact that I have noticed in patients suffering from tobacco amblyopia, a very peculiar "dry and fusty" smell; it is not that of breath impregnated with tobacco, nor does it seem to me to be merely that of stale tobacco. I cannot describe it accurately, but I have no doubt that most will recognise what I mean. The deduction is obvious, that it is only due to smoke hanging about those who are as a rule heavy consumers of tobacco. At the same time toxic symptoms are not by any means peculiar to the heaviest smokers, and without saying that the smell is peculiar to those only who have toxic symptoms, yet as far as my memory serves me, it is constantly present in all unequivocal "tobacco" cases, and at any rate frequently absent in heavy smokers. It would be interesting to ascertain whether there is any ground for the

suggestion that this smell co-exists with saturation of the system with nicotine, or whether this special connection only exists in my imagination.*

* The odour here described we have often remarked in cases of tobacco amblyopia, and indeed have not infrequently had our first suspicion aroused as to the true nature of the case by its detection.—(Ed.)

ON THE FREQUENCY OF CILIO-RETINAL VESSELS AND OF PULSATING VEINS.

By W. Lang, F.R.C.S. Eng.,

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Demonstrator and Examiner in Physiology to the University of Melbourne.

About 18 months since a discussion took place between the writers on the subject of the frequency of these two conditions, and as we could not agree, we determined to examine the eyes of a number of persons who presented themselves at the Moorfields clinic. We did not select them on any plan but took them indiscriminately.

The Presence of Cilio-Retinal Vessels.

We define a cilio-retinal vessel as one which dips into the nerve near the margin of the optic disc, and which can be seen to arch outwards, that is, away from the disc before it finally disappears from view. Many vessels emerge from the outer part of the disc, but we do not think that they can be justly regarded as cilio-retinal unless this curvature can be seen; where the curvature was not marked we have specified the vessel as a "doubtful cilio-retinal."

The eyes we examined were mostly those of young adults. The pupils were always dilated by our homatropine and cocaine solution in castor oil to permit of thorough examination.

In 37 or 77 per cent. there were no cilio-retinal vessels; in 3 or 6·3 per cent. there were doubtful cilio-retinal vessels, and in only 8 or 16·7 per cent. were they distinctly visible. They were usually on the outer side of the disc and single.

Pulsation of the Veins on the Disc.

At first we examined by the direct method without the previous use of any mydriatic, fearing lest any increase of tension caused by the mydriatic might cause pulsation.

To settle this point we examined a few cases both before and after the application of our solution of homatropine and cocaine, and finding that there was no discernible difference with respect to the pulsation, we have since examined all cases after such application has been made.

The eyes examined were those of persons varying in age from 11 to 65, but mostly young adults. The refractive character varied, some being myopic, others hypermetropic and astigmatic.

Of 61 eyes examined: in 45 or 73·8 per cent. pulsation was distinct; in 9 or 14·8 per cent. it was doubtful; and in 7 or 11·4 per cent. it was absent altogether.

As far as our information goes there are no circumstances common to all the individuals in whom pulsation was absent which throw any light on its physiological causation.